IN THE CLAIMS

Please amend Claims 1,7, 8, 9, 10, 11, 13, 14, 15, 21, 27, and 30, and add new Claim 31 as follows:

1. (Currently amended) For use in data network, optical ~~Optical~~ data communications apparatus, comprising:

a first coherent light source adapted to produce first electromagnetic radiation; and

an atomic medium adapted to substantially alter the speed of propagation of said first electromagentic radiation therethrough;

wherein said first electromagnetic radiation is used to transfer a plurality of data bits from one location to at least one second location, said second location being distant from said first location within said network; and

wherein said atomic medium stores quantum state information that can be subsequently read out therefrom.

2. (Cancelled)

3. (Original) The apparatus of Claim 1, wherein said medium comprises at least in part Rubidium (Rb) atoms.

4. (Original) The apparatus of Claim 1, further comprising a second coherent light source, said second light source adapted to produce second electromagnetic radiation, said second electromagnetic radiation cooperating with said atomic medium to provide said altering of said speed of propagation.

5. (Original) The apparatus of Claim 4, wherein said apparatus comprises a delay device adapted to selectively delay the propagation of said first electromagnetic radiation to said at least one second location.

6. (Cancelled)

7. (Currently amended) For use in data network used to transfer a plurality of data bits from one location to at least one second location, said second location being distant from said first location within said network, a [[A]] method of conditioning light energy ~~in an optical data communication system,~~ comprising:

providing first electromagnetic radiation having information associated therewith;

providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation to store at least part of said information therein; and

selectively and subsequently irradiating said medium with said second radiation, said second radiation at least in part controlling the readout of said stored information from said medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on ~~receiving input from~~ dispersion analysis of at least a portion of said data ~~communication system~~ network.

8. (Currently amended) The method of Claim 7, wherein said ~~act of receiving input~~ dispersion analysis comprises ~~receiving information relating to~~ accounting for the estimated dispersion of light energy pulses within said ~~system~~ network.

9. (Currently amended) The method of Claim 7, further comprising diverting at least a portion of said first radiation for propagation within said ~~communication system~~ network apart from said atomic medium.

10. (Currently amended) The method of Claim 9, wherein said ~~act of receiving input~~ dispersion analysis comprises ~~receiving information relating to~~ accounting for the estimated dispersion of said at least portion of said first radiation.

11. (Currently amended) For use in data network used to transfer a plurality of data bits from one location to at least one second location, said second location being distant from said first location within said network, a [[A]] method of obtaining information from light energy, comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

providing second electromagnetic radiation;

providing third electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation so as to alter the propagation speed of said first radiation within said medium;

interrogating said medium using said third radiation so as to obtain a readout therefrom; and

obtaining said information from said first radiation based on the interaction of at least said third radiation with said first radiation.

12. (Original) The method of Claim 11, further comprising generating at least one light pulse based on said act of obtaining.

13. (Currently amended) The method of Claim 12, further comprising transmitting said at least one light pulse over said network ~~an optical communications system~~.

14. (Currently amended) The method of Claim 13, further comprising controlling said acts of selectively irradiating and transmitting said at least one light pulse over said ~~system~~ network so as to create a desired temporal relationship between said first radiation and said at least one light pulse.

15. (Currently amended) For use in a data network, optical ~~Optical~~ pulse conditioning apparatus, comprising:

a trapped and cooled medium adapted to receive modulated light energy from a first light source;

a second source of electromagnetic energy adapted to irradiate at least a portion of said medium using electromagnetic energy, said electromagnetic energy altering the propagation of said modulated light energy through said medium; and

controller apparatus operatively controlling said irradiation of said medium by said electromagnetic energy so as to control at least one physical parameter of said modulated light energy for transmission across said network.

16. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises pulse width.

17. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises the chromatic content of said modulated light energy.

18. (Original) The apparatus of Claim 15, wherein said at least one parameter comprises the amplitude of at least one constituent wavelength of energy within said modulated light energy.

19. (Cancelled)

20. (Previously presented) The apparatus of Claim 15, wherein said controller apparatus further comprises an optical modulator, said modulator adapted to modulate said electromagnetic energy.

21. (Currently amended) The apparatus of Claim [[19]] 20, further comprising a digital data processor, said processor operatively coupled to said optical modulator, said processor controlling the operation of said modulator at least in part.

22. (Previously presented) The apparatus of Claim 1, wherein said medium comprises a magnetically trapped medium.

23. (Previously presented) The apparatus of Claim 1, wherein said medium comprises a cooled Bose-Einstein condensate.

24. (Previously presented) The apparatus of Claim 1, wherein said medium comprises a medium cooled by multi-dimensional Doppler cooling.

25. (Previously presented) The apparatus of Claim 1, wherein said alteration of the speed of propagation of said first electromagnetic radiation through said medium comprises completely stopping the propagation of said first radiation for at least a period of time.

26. (Previously presented) The method of Claim 11, wherein said alteration of the speed of propagation of said first radiation through said medium comprises completely stopping the propagation of said first radiation for at least a period of time.

27. (Currently amended) For use in data network used to transfer a plurality of data bits from one location to at least one second location, said second location being distant from said first location within said network, a [[A]] method of conditioning light energy ~~in an optical communication system,~~ comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on ~~receiving input from~~ analysis of at least a portion of said ~~communication system~~ network;

wherein said act of receiving input comprises ~~receiving information relating to~~ determining the projected dispersion of light energy pulses within at least a portion of said ~~system~~ network.

28. (Previously presented) A method of conditioning light energy in an optical communication system, comprising:

providing first electromagnetic radiation having a plurality of information associated therewith;

providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on receiving input from said communication system; and

wherein said method further comprises diverting at least a portion of said first radiation for propagation within said communication system apart from said atomic medium.

29. (Previously presented) The method of Claim 28, wherein said act of receiving input comprises receiving information relating to the dispersion of said at least portion of said first radiation.

30. (Currently amended) For use in data network used to transfer a plurality of data bits from one location to at least one second location, said second location being distant from said first location within said network, a [[A]] method of storing and subsequently reading out data from an atomic medium of said network, comprising:

providing first electromagnetic radiation having a data associated therewith;

providing second electromagnetic radiation;

irradiating said atomic medium with said first electromagnetic radiation; and

selectively irradiating said medium with said second radiation at two or more subsequent times to said irradiation with said first radiation, said second radiation at least in part controlling the propagation of said first radiation through said medium of said network;

wherein said act of selectively irradiating causes the same of said information to retrieved from said medium two or more times.

31. (New) A method of conditioning light energy in an optical data communication system, comprising:

providing first electromagnetic radiation having information associated therewith;

providing second electromagnetic radiation;

providing an atomic medium;

irradiating said atomic medium with said first electromagnetic radiation to store at least part of said information therein;

selectively and subsequently irradiating said medium with said second radiation, said second radiation at least in part controlling the readout of said stored information from said medium; and

diverting at least a portion of said first radiation for propagation within said communication system apart from said atomic medium;

wherein said act of selectively irradiating comprises controlling the application of said second radiation to said atomic medium based on receiving input from said data communication system.